REMARKS

This Amendment and the following remarks are intended to fully respond to the Office Action mailed June 28, 2007, hereinafter "Office Action." In that Office Action, claims 1-28 were examined and all claims were rejected. More specifically, claims 1-28 were rejected under 35 U.S.C. § 101 as being non-statutory subject matter; and claims 1-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gupta et al., US Patent No. 6,438,562 filed on August 24, 1999,hereinafter "Gupta," in view of Blank et al., US Patent No. 5,842,208 published on November 24, 1998, hereinafter "Blank."

Reconsideration of these rejections, as they might apply to the original and amended claims in view of these remarks, is respectfully requested.

In this Response, claims 1, 10, 12-14, 18, 20, 24, and 27 have been amended and no claims have been added or canceled. Therefore, claims 1-28 remain present for examination.

Summary of Interview

Applicants would like to thank the Examiner for his comments during and Examiner initiated phone conversation on or about April 12, 2007. Examiner made suggestions regarding clarifying certain claim language. No agreement was reached.

Interview Request

In order to further prosecution, applicants have submitted an in-person interview request with this amendment. The Applicant's representatives will be in Washington D.C. on December 14th. If that date does not work for the Examiner, Applicants request a telephonic interview.

The interview request has been faxed to (571) 273-8300, the fax number for the organization where the application or proceeding is assigned.

Claim Rejections – 35 U.S.C. § 101

Claims 1-28 were rejected under 35 U.S.C. § 101 because the Office Action asserts that they are directed to non-statutory subject matter. Claims 1 and 20 have been amended to recite

storing the final index for later use in locating records; claim 14 has been amended to recite a store tool that stores the final database table index for later use in locating records; claim 18 has been amended to recite storing a result produced by the first processing unit for later use in locating records; claim 24 has been amended to recite a store module that stores the final index for later use in locating records; and claim 27 has been amended to recite means for storing the merged sub-indexes for later use in locating records. The claims recite useful, concrete, and tangible results. *State Street Bank and Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998). Namely, the indexes allow queries to be resolved much more quickly by providing relatively short paths to desired information. (Application, p.2, ll. 3-5). Storing the index allows another query to make use of the index to access information without having to first reconstruct the index. This saves additional time and allows an even quicker resolution of future queries.

Claims 12-13 have been amended to recite a computer storage medium. The specification states,

> Computer storage media includes volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, program modules or other data. Memory 24, removable storage 28 and non-removable storage 30 are all examples of computer storage media. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by system 20. (Specification, p. 8, ll. 5-13).

Thus, the embodiments recited in the amended claims are encoded in tangible, computer-readable media and are, thus, patentable subject matter under 35 U.S.C. § 101. *In re Beauregard*, 53 F.3d 1583, 1584 (Fed. Cir. 1995). Applicant's respectfully request that the Examiner withdraw the § 101 rejection and issue a notice of allowance, for all claims.

Claim Rejections – 35 U.S.C. § 103(a)

Claims 1-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gupta in view of Blank. Applicants respectfully traverse the § 103(a) rejections because either the

Examiner failed to state a *prima facie* case of obviousness or the current amendments to the claims now render the Examiner's arguments moot. To establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), the references must teach or suggest all of the claimed limitations to one of ordinary skill in the art at the time the invention was made. M.P.E.P §§ 2142, 2143.03; *In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974); *In re Wilson*, 424 F.2d 1382, 1385 (C.C.P.A. 1970). Further, under *KSR Int'l Co. v. Teleflex, Inc.*, there "must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." 127 S. Ct. 1727, 1741 (2007). Neither Gupta nor Blank, either separately or in combination, teach or suggest all of the limitations of the recited claims.

Gupta relates to "a method, system, and product for coordinating parallel update for a global index of and indexed table." (Gupta, Abstract). "Techniques for maintaining a *global index* of a table during parallel data manipulations operations involve a coordinator process, data manipulation slaves and index update slaves. The coordinator process distributes data manipulation operations among a plurality of data manipulation slaves." (Gupta, col. 8, ll. 1-6) (emphasis added). Maintenance of the global index is performed with the use of Data Manipulation Language ("DML") commands. (*See* Gupta, col. 4, ll. 43-45). Gupta specifically states that the DML commands supported are "commands to delete rows, insert rows, and update rows." (Gupta, col. 4, ll. 47-48). No mention is made of creating actual indexes. Instead, Gupta teaches a method using parallel DML ("PDML") operations that accomplishes the "need to update a global index as a result of PDML operations without suffering the deficiencies of lost clustering, or contention for the same block, the latter leading to excessive waits or block pinging." (*See* Gupta, col. 7, ll. 35-38).

Gupta does not teach a parallel *processing unit* environment. Instead, Gupta teaches parallel *processes* that are executed by a single processing unit. (*See* Gupta, FIG. 4). These multiple processes are executed by the single processing unit. (*See* Gupta, col. 9, l. 23 – col. 10, l. 16). Gupta also teaches that indexes may be stored as B-Trees. (Gupta, FIG. 3).

Blank relates to a "recover/build index system [that] builds an index for a file by scanning partitions of the file in parallel to retrieve key/rid values. The recover/build index system then sorts the scanned key/rid values for each partition in parallel." (col. 1, ll. 37-41).

After the data is sorted in parallel, a "merge program merges the sort streams received from the sort programs to create a merge stream. The merge program accepts the sort stream from two or more sort programs. The merge program then passes the merge stream to an index build program." (col. 3, ll. 10-14). Thus, Blank teaches a method where a parallel sort is merged via combining the data streams produced by two or more sorts into a single data stream. Blank then performs *index creation on this single data stream.*

Claim 1

Independent claim 1 is allowable over the cited art because the cited art fails to teach or suggest all of its limitations. For example, the cited references fail to teach or suggest at least determining partition delimiters, each partition delimiter separating the table into non-overlapping partitions of records, each partition dedicated to one processing unit for index creation. Gupta cannot teach this limitation because the reference only teaches the use of one processing unit. The Office Action points to a portion of Gupta related to multiple slave processes to show this limitation. (col. 14, ll. 44-50 and 54-56). A process is not a processing unit. Blank fails to compensate for this deficiency. Claim 1 provides that the table is separated into non-overlapping partitions of records. In part, the fact that the partitions do not overlap permits the method of claim 1 to properly create multiple sub-indexes. On the other hand, because Blank does not create sub-indexes for each partition it is not necessary to ensure that the partitions do not overlap. Blank appears to be performing a "divide-and-conquer" sort algorithm using multiple processing units where it is unnecessary to ensure that the data partitions do not overlap.

The references also fail to teach or suggest at least accessing the table records in parallel, wherein each processing unit accesses each of the records. Clearly, Gupta cannot teach or suggest this limitation because the reference only teaches the use of one processing unit. However, the Office Action cites Gupta as teaching this limitation. The portion of Gupta cited by the Office Action as teaching this limitation relates to a single coordinator process that distributes data manipulation tasks among a number of data manipulation slaves and index update slaves. (*See* Gupta, col. 8, ll. 1-13). The *single* coordinator process directing multiple slaves is not the same as each processing unit accesses each of the records. First, there is no

suggestion in Gupta that each of the slaves accesses each record in the table. Second, even if each record was accessed by each slave process in Gupta (which does not appear to be true), Gupta is teaching *multiple processes, not processing units*.

Although not cited by the Office Action, Blank does not compensate for this deficiency. While multiple processing units are taught in Blank, the reference also teaches that each processing unit accesses only a portion of the table, i.e., each processing unit scans a single partition. Blank teaches,

> [t]he scan programs **108** executing in parallel extract key values (of a particular key) and record identifiers (rids) or pointers from the partitions **120** to create a key/rid or scan stream *for each partition* **112**. (Blank, col. 2, l. 64 – col. 3, l.1) (emphasis added).

The scan programs in Blank are only assigned a particular partition of the table, not each of the records in the table.

The references also fail to teach or suggest at least filtering the accessed records in parallel, wherein each processing unit determines which records to keep. Again, Gupta cannot possibly teach this because the reference teaches the use of a single processing unit. However, the Office Action again cites Gupta as teaching this limitation. The portions of Gupta cited by the Office Action as teaching this limitation instead relate to a single coordinator process determining a range of key values and assigning slaves to each range. (Gupta, col. 7, ll. 45-51). Again, the coordinator process and the slaves are under the control of a single processing unit making it impossible for Gupta to teach this limitation. Furthermore, Blank cannot compensate for this deficiency because it assigns processing units to different partitions. Because each processing unit does not scan each record of the table, Blank does not teach or suggest each processing unit determines which records to keep.

Additionally, the references do not teach or suggest at least merging the sub-indexes together to create a final index related to the table. In fact, the Office Action assents that Gupta does not teach this. (*See* Office Action, p. 9). Instead, the Office Action relies upon Blank as teaching this limitation. Blank does not teach the creation of sub-indexes, thus making it

impossible for the reference to teach or suggest merging the sub-indexes together to create a final index related to the table. In fact, Blank does the opposite. Before creating an index, Blank scans and sorts multiple partitions of a database. These resulting sorted data streams are then merged together into a single data stream. Blank teaches creating the index based off of the *single data stream* that results from merging the various sort streams together. The sort streams are not indexed, and therefore cannot be considered sub-indexes.

The Office Action argues that both Gupta and Blank teach sub-indexes. Applicants respectfully disagree. The Office Action asserts that the B-tree taught in Gupta provides an example of sub-indexes. (*See* Office Action, pp. 22-23). The Office Action is apparently equating each node of a B-Tree to a separate sub-index. Applicants disagree. First, the B-tree is used to store a *final index*. Second, the B-tree is simply a data structure used for storing the index. B-trees are data structures commonly used to store database information. This is due to the ability of B-trees to become unbalanced, thus allowing for a logarithmic lookup time when accessing the B-tree. To maintain a balanced structure, B-trees may add empty data or reorganize data, thus leaving the possibility of empty nodes in the B-tree.

Although the data structure is divided into nodes, these nodes are all a part of the single index. B-trees, like all trees, have a hierarchical structure. This hierarchical structure is inherent to the structure, not a result of multiple sub-indexes. The Office Action is making a logical leap in declaring that the nodes of the storage structure are separate sub-indexes. Databases are generally large and span multiple storage devices. One would not say that a database spanning multiple storage devices is actually multiple databases wherein each database corresponds to a separate storage device. In this same line of logic, a single index divided due to the properties of the data structure it is stored upon cannot be said to be multiple sub-indexes.

Applicants also respectfully disagree with the Office Action's assertion that Blank teaches sub-indexes. (*See* Office Action, p. 24). As previously mentioned, Blank teaches separate sort streams that are combined into a single data stream. This single data stream, not the sort streams, is indexed. The Office Action appears to equate the sort streams to sub-indexes. However, the sort streams are clearly not sub-indexes because they are not indexed. In fact, Blank teaches away from the creation of multiple sub-indexes, instead teaching merging sorted

stream *before* creating an index of the data. The claimed subject matter uses multiple processing units to create multiple indexes, which is an efficiency benefit lost in Blank due to its indexing of a single data stream.

For the above mentioned reasons, Applicants maintain that the cited references also fail to teach or suggest at least independently creating a plurality of sub-indexes, wherein at least two sub-indexes are created by different processing units. For at least these foregoing reasons, independent claim 1 is allowable over the cited references.

Claim 14

Independent claim 14 is allowable over the cited references. Claim 14 recites, *inter alia*, a plurality of processing units that respectively accesses the database table in parallel, the respective processing units accesses each of the records and filters the accessed records to determine which records to keep and wherein each of the respective processing units creates a sub-index of database table records resulting in a plurality of sub-indexes. As previously mentioned, Gupta cannot teach or suggest this limitation because the reference only teaches the use of a single processing unit. Although multiple processes are taught, these processes all rely on a single processing unit. Thus, Gupta does not provide the processing efficiency of the claimed limitation. Additionally, because each processing unit in Blank only scans a partition of a table, Blank cannot teach or suggest the respective processing units accesses each of the records and filters the accessed records to determine which records to keep and wherein each of the respective processing units creates a sub-index of database table records resulting in a plurality of sub-indexes.

Again, because neither reference teaches sub-indexes, the references also fail to teach or suggest a merge tool that merges the plurality of sub-indexes into a final database table index. The references, nether alone nor in combination, teach or suggest at least these limitations of claim 14. For at least these reasons, claim 14 is allowable over the cited references.

Claim 18

Independent claim 18 is allowable over the cited references. For example, the references fail to teach or suggest at least determining partition delimiters, each partition delimiter

separating the table into non-overlapping partitions of records, wherein at least one partition is dedicated to a first processing unit for index creation and at least one other partition is dedicated a second processing unit for index creation. As previously mentioned, Gupta cannot teach or suggest this limitation because the reference teaches the use of a single processing unit. Furthermore, Blank cannot compensate for this deficiency. Blank teaches sorting multiple partitions. However, before creating an index, these partitions are merged together. Thus, Blank teaches creating an index for the *entire table*, not creating indexes for *partitions of the table*. Thus, the references, either alone or in combination, fail to teach or suggest all of the limitations of claim 18. For at least this reason, claim 18 is allowable over the cited references.

Claim 20

Independent claim 20 is allowable over the cited references. The references fail to teach or suggest at least determining partition delimiters, each partition delimiter separating the table into non-overlapping partitions of records, each partition dedicated to one processing unit for index creation. Again, Gupta cannot teach this because the reference teaches a single processing unit. Blank cannot compensate for this deficiency because it does not teach or suggest non-overlapping partitions. Because Blank only scans and sorts the partitions, it is not necessary that the partitions are non-overlapping. On the other hand, because embodiments of the present disclosure create sub-indexes for each partition, it is necessary to ensure that each partition contains non-overlapping data.

Additionally, the references fail to teach or suggest at least independently creating a plurality of sub-indexes, wherein at least two sub-indexes are created by different processing units. As previously noted, Applicants maintain that neither of the cited reference teach or suggest the creation of sub-indexes. The nodes of a B-tree used to store indexes in Gupta do not constitute separate sub-indexes and Blank teaches merging the sorted partitions together before creating a final index. In light of this, the references also cannot teach or suggest, either alone or in combination, merging the sub-indexes together to create a final index related to the table. For at least the forgoing reasons, claim 20 is allowable over the cited references.

Claim 24

Independent claim 24 is allowable over the cited references. The cited references do not teach or suggest, either alone or in combination at least, two or more index creation modules, each index creation module associated with a processing unit, each index creation module creates a sub-index resulting in a plurality of sub-indexes. Gupta cannot teach this limitation because it only teaches a single limitation. Blank cannot compensate for this deficiency because, as previously noted, the reference teaches merging different sort streams into a single stream before creating a final index, not creating multiple sub-indexes and merging the sub-indexes into a final index. For at least these reasons, the references also do not teach or suggest a merge module that merges the sub-indexes into a final index. For at least these reasons, claim 27 is allowable over the cited references.

Claim 27

Independent claim 27 is allowable over the cited references. Claim 27 recites means for creating two or more sub-indexes of relevant records; and means for merging the sub-indexes. For the previously stated reasons, Applicants maintain that neither reference teaches or suggests sub-indexes. Furthermore, Gupta does not teach means for merging the sub-indexes. Blank does not compensate for this deficiency because Blank teaches merging sort streams, not sub-indexes, and the creating an index from the merged sort streams. For at least the forgoing reasons, claim 27 is allowable over the cited references.

For the forgoing reasons, neither Gupta nor Blank, either alone or in combination, teach all of the limitations of independent claims 1, 14, 18, 20, 24, and 27 or therefore cannot anticipate the present invention as claimed. Claims 1, 14, 18, 20, 24, and 27 are allowable over the prior art of record and should be allowed. All other claims, *i.e.*, claims 2-13, 15-17, 19, 21-23, 25-26, and 28 depend from one of the allowable independent claims and are, thus, also allowable over the prior art of record. Therefore, Applicants respectfully request that the Examiner issue a notice of allowance, for all claims, at his earliest convenience.

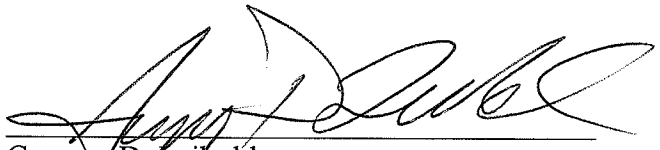
Conclusion

This Amendment fully responds to the Office Action mailed on June 28, 2007. Still, that Office Action may contain arguments and rejections that are not directly addressed by this Amendment due to the fact that they are rendered moot in light of the preceding arguments in favor of patentability. Hence, failure of this Amendment to directly address an argument raised in the Office Action should not be taken as an indication that the Applicants believe the argument has merit. Furthermore, the claims of the present application may include other elements, not discussed in this Amendment, which are not shown, taught, or otherwise suggested by the art of record. Accordingly, the preceding arguments in favor of patentability are advanced without prejudice to other bases of patentability.

It is believed that no further fees are due with this Response. However, the Commissioner is hereby authorized to charge any deficiencies or credit any overpayment with respect to this patent application to deposit account number 13-2725.

In light of the above remarks and amendments, it is believed that the application is now in condition for allowance, and such action is respectfully requested. Should any additional issues need to be resolved, the Examiner is respectfully requested to telephone the undersigned to attempt to resolve those issues.

Respectfully submitted,



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